WE CLAIM:

1. A method of machining a hollow metal workpiece having a plurality of small-diameter throughgoing holes and at least one large-diameter hole, the method comprising the steps of:

picking up from a transfer station by a grab a hollow workpiece and displacing the workpiece from the transfer station to a machining station;

thereafter, while holding the workpiece in the grab,

a) engaging a tool from outside with a first exterior surface of the workpiece and thereby finishing the first exterior surface;

b) reorienting the workpiece by the grab and engaging a tool with a second exterior surface of the workpiece offset from the first exterior surface and thereby finishing the second exterior surface;

c) fitting another tool through the large-diameter hole of the workpiece and positioning the other tool inside the workpiece adjacent one of the small-diameter holes;

d) coupling a drive spindle through the one small-diameter hole of the workpiece with the other tool and machining an inner surface of the

workpiece adjacent the one small-diameter hole with the other tool; and

e) repeating steps b), c), and d) to finish another interior surface of the workpiece adjacent another of the small-diameter holes; and

displacing the workpiece from the machining station back to the transfer station and releasing it from the grab.

2. The machining method defined in claim 1 wherein the exterior surfaces are surfaces of the small-diameter holes.

3. The machining method defined in claim 2 wherein the surfaces of the small-diameter holes are generally cylindrical.

4. The machining method defined in claim 1 wherein in step b) the workpiece is rotated about an axis through about 90°.

5. The machining method defined in claim 1, further comprising the step during step d) of

engaging a tailstock through another of the small-diameter holes with the other tool after coupling of the other tool to the drive spindle to brace the other tool.

6. An apparatus for machining a hollow metal workpiece having a plurality of small-diameter throughgoing holes and at least one large-diameter hole to produce a part having a plurality of finished exterior and interior surfaces, the apparatus comprising:

means including a grab for picking up from a transfer station the hollow workpiece and displacing the workpiece from the transfer station to a machining station;

means including a tool engageable with a first exterior surface of the workpiece in the grab for finishing the first exterior surface;

drive means connected to the grab and for reorienting the workpiece and engaging the tool with a second exterior surface of the workpiece offset from the first exterior surface and thereby finishing the second exterior surface;

means including for fitting another tool through the large-diameter hole of the workpiece and positioning the other tool inside the workpiece adjacent one of the small-diameter holes;

means including a drive spindle engageable through the one small-diameter hole of the workpiece for coupling the spindle

to the other tool and machining an inner surface of the workpiece adjacent the one small-diameter hole with the other tool; and

means for displacing the workpiece from the machining station back to the transfer station and releasing it from the grab.

7. The machining apparatus defined in claim 6, further comprising

a tailstock engageable through another of the small-diameter holes with the other tool after coupling of the other tool to the drive spindle to brace the other tool.

8. The machining apparatus defined in claim 7 wherein the tailstock is displaceable parallel to a rotation axis of the spindle.

9. The machining apparatus defined in claim 6 wherein the tools are all rotatable about parallel axes, the means including the grab further including:

a main slide displaceable perpendicular to the rotation axes; and

a carriage displaceable on the main slide parallel to the rotation axes and carrying the grab.